

I claim:

1. A method for spell checking an intended word entered using a reduced keypad, where each of one or more input keys of the reduced keypad is mapped to a plurality of letters, the method comprising:

5 for an entered key input, finding one or more potential words from a dictionary of words, where each potential word has a cost between the entered key input and an input key sequence corresponding to the potential word less than or equal to a maximum cost; and,

presenting at least one of the one or more potential words as the intended word.

10 2. The method of claim 1, wherein the reduced keypad is a numeric keypad.

3. The method of claim 1, further initially comprising receiving the entered key input.

4. The method of claim 1, further initially comprising:

determining a word corresponding to the entered key input as the intended word;

determining whether the word determined is in the dictionary of words; and,

15 ending the method in response to determining that the word determined is in the dictionary of words.

5. The method of claim 1, wherein finding the one or more potential words comprises:

for each word in the dictionary of words,

determining the cost between the entered key sequence and the key sequence

corresponding to the word; and,

adding the word to the one or more potential words in response to determining that the cost is less than or equal to the maximum cost.

6. The method of claim 5, wherein determining the cost between the entered key sequence and the key sequence corresponding to the word comprises recursively determining the cost until one of a first condition and a second condition is met, where the first condition is the cost is so far greater than the maximum cost, and the second condition is the cost has been completely determined as less than or equal to the maximum cost.
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- 10 7. The method of claim 5, wherein determining the cost between the entered key input sequence and the key sequence corresponding to the word comprises employing a dynamic programming approach.
- 15 8. The method of claim 1, wherein the cost between the entered key input and the input key sequence corresponding to the word is the minimum edit distance between the entered key input and the input key sequence corresponding to the word.
9. The method of claim 1, wherein the dictionary is stored as a tree.
10. The method of claim 1, wherein the dictionary is stored as a directed acyclic graph (DAG) model.

11. The method of claim 1, wherein the dictionary is a letter-based dictionary in which each word thereof is stored only by a constituent letter sequence corresponding to the word.

12. The method of claim 1, wherein the dictionary is a key-based dictionary in which
5 each word thereof is stored by at least the key sequence corresponding to the word.

13. The method of claim 1, wherein the method is performed by execution of a computer program by a processor from a computer-readable medium.

14. A computer-readable medium having instructions stored thereon for execution by a processor to perform a method for determining a word entered using a reduced keypad,

10 where each of one or more input keys of the reduced keypad is mapped to a plurality of letters, the method comprising:

receiving key input corresponding to the word, the key input having a left context;

for each word in a vocabulary that is consistent with the key input, determining a probability of the word given the left context, and adding the word and the probability of

15 the word to an array of word-probability pairs;

finding one or more potential words from a dictionary of words, where each potential word has a cost between the entered key input and an input sequence corresponding to the potential word less than or equal to a maximum cost;

determining a probability of each potential word given the left context and taking into
20 account a probability that each letter of the potential word is misspelled, and adding the potential word and the probability of the word to the array;

determining the word corresponding to the key input as a word of a word-probability pair within the array of word-probability pairs having a greatest probability.

15. The medium of claim 14, wherein the reduced keypad is a numeric keypad.

16. The medium of claim 14, wherein determining the word corresponding to the key
5 input comprises:

sorting the array of word-probability pairs in decreasing order of probability; and,
determining the word corresponding to the key input as a word of a first word-probability pair within the array of word-probability pairs.

17. The medium of claim 14, the method further initially comprising, for each word in a
10 cache that is consistent with the key input, determining a probability of the word given
the left context, and adding the word and the probability of the word to an array of word-probability pairs.

18. The medium of claim 14, the method further comprising prior to determining the
word corresponding to the key input:

15 for each word in the vocabulary that is consistent with the key input as an initial part
of the word, determining a probability of the word given the left context, and, upon
determining that the probability is greater than a greatest probability so far determined,
setting the greatest probability to the probability and a greatest probability word
associated with the greatest probability to the word;

20 upon determining that the greatest probability is at least a number of times greater

than a word of a first word-probability pair of the array of word probability-pairs, adding the greatest probability word associated with the greatest probability and the greatest probability a new first word-probability pair to the array.

19. The medium of claim 18, the method further initially comprising prior to determining the word corresponding to the key input, for each word in a cache that is consistent with the key input as an initial part of the word, determining a probability of the word given the left context, and, upon determining that the probability is greater than the greatest probability so far determined, setting the greatest probability to the probability and a greatest probability word associated with the greatest probability to the word.

10 20. The medium of claim 18, the method further comprising prior to determining the word corresponding to the key input:

finding one or more additional potential words from the dictionary, where each additional potential word has a cost between the entered key input and a prefix of a key sequence corresponding to the potential word less than or equal to a maximum cost;

15 determining a probability of each potential additional word given the left context, and upon determining that the probability is greater than the greatest probability so far determined, setting the greatest probability to the probability of the potential additional word and the greatest probability word associated with the greatest probability to the potential additional word.

20 21. The medium of claim 14, wherein determining the probability of each potential word further takes into account a small word penalty.

22. The medium of claim 14, wherein determining the probability of each potential word further takes into account a last letter insertion/deletion penalty.

23. The medium of claim 14, wherein the cost between the entered numeric key input and the key sequence corresponding to the potential word is the minimum edit distance

5 between the entered key input and the key sequence corresponding to the potential word.

24. An apparatus comprising:

 a plurality of keys, each of one or more of the keys mapped to a plurality of letters, the plurality of keys used to enter key input corresponding to a word, the key input having at least one of a left context and a right context; and,

10 a spell-checking logic designed to provide potential alternative words for the word corresponding to the key input entered, where the word is misspelled, taking into account that the word was entered using the plurality of keys, as opposed to a keyboard having a unique key for each of a plurality of letters.

25. The apparatus of claim 24, wherein the spell-checking logic is further to determine

15 one or more potential words to the word where the word is not found in a dictionary of words, by at least finding the one or more potential words from the dictionary, each potential word having a cost between the key input and an input sequence corresponding to the potential word less than or equal to a maximum cost.

26. The apparatus of claim 24, further comprising a word-determining logic designed to

20 determine the word corresponding to the key input by using a machine learning approach

based on one or more of the at least one of the left context and the right context of the key input.

27. The apparatus of claim 26, wherein the spell-checking logic is part of the word-determining logic.

5 28. The apparatus of claim 24, further comprising a display on which the at least one of the left context and the right context, and the word corresponding to the key input, are displayed.

29. The apparatus of claim 24, wherein the apparatus is a telephone.

30. The apparatus of claim 29, wherein the apparatus is a mobile telephone.

10 31. The apparatus of claim 29, wherein the apparatus is one of: a cellular telephone, a corded telephone, a cordless telephone, a digital telephone, and a radio telephone.

32. The apparatus of claim 24, wherein the apparatus is one of: a pager, a desktop computer, a laptop computer, a handheld device, a personal-digital assistance (PDA) device, and a remote control device.

15 33. The apparatus of claim 24, wherein the spell-determining logic comprises a computer program stored on a computer-readable medium for execution by a processor.